SECTION 2

INVENTORY OF URANIUM MINES

2.0 Inventory of Uranium Mines

To inventory the numbers, types, and locations of uranium mines in the United States, we used data from the Department of Energy, Grand Junction Office (DOE-GJO). We produced the inventory of uranium mines presented in this section and Appendixes E and F of this report from the DOE-GJO master data file (DOE79a) and personal communications with DOE-GJO (Ch80, ME80a, ME80b). These two sources combined yielded our own EPA master data file, which we divided into two parts - active and inactive mines.

Table 2.1 classifies active and inactive U.S. uranium properties according to the method of uranium production (mine type) based on data that were current as of 1978 (Me80a). The major mining methods are surface and underground mines (DOE79b). The remaining mining methods are only minor contributors to the total uranium ore production (DOE79b).

Table 2.1 shows a total of 340 active mines. This final total, which is 52 less than the original total of 392 active mines provided by DOE-GJO (Me80a), was derived, in consultation with DOE-GJO (Me80b), by eliminating 43 mines that were duplicated on the list and 9 that were small producers (i.e., producing only a few tons of ore for the entire year of 1978). Most (if not all) of the 52 eliminated mines were either underground or surface mines.

The original totals of 305 active underground mines and 63 active surface mines (DOE79b), whose combined total of 368 mines accounts for the later eliminated 52 mines that were duplicate listings or small producers, were the totals we used in modeling the average underground and surface mines in this study. The differences between these totals and the smaller Table 2.1 totals of 256 active underground mines and 60 active surface mines are insignificant compared with other uncertainties in predicting health effects. The smaller totals for underground and surface mines would introduce differences of less than 17% and less than 5% for the active average underground and average surface model mines, respectively.

Table 2.2 gives locations and types of active uranium mines by state. With respect to the number of mines, Colorado and Utah dominate the inventory, especially for underground mines. However, since New Mexico and

Wyoming have large mines (underground in New Mexico, and surface in Wyoming) and dominate ore production, New Mexico is the site of our model active underground mines and Wyoming is the site of our model active surface mines. Our model in situ leaching operation is also sited in Wyoming, which is one of two states mining uranium with that method. Appendix E gives a complete inventory of active uranium mines.

The numbers of inactive uranium mines according to state and mining method are given in Table 2.3. Colorado and Utah have the greatest number of inactive mines, but Arizona, Wyoming, New Mexico, and South Dakota also contain significant numbers. Since New Mexico and Wyoming have dominated ore production over the past 10 years (DOE79b), New Mexico (because of its large underground mines) is our model site for inactive underground mining and Wyoming (because of its large surface mines) is the site of our model inactive surface mine. Appendix F gives a complete inventory of inactive uranium mines.

Figures 2.1 through 2.9 are maps showing the locations, status, and types of uranium mines in Colorado, New Mexico, Texas, Utah, and Wyoming (Ch77, Co78a, Co78b, Co78c, Ea73, Gl75, Hi69, Pe79, Ut77). Since it is not always possible to show all the mines in a given district, the maps indicate only the area and number of mines in some major mining districts, particularly for Colorado and Utah. The maps do not show the location of many small mines started during the uranium boom of the 1950's because their exact locations are unknown. In Colorado alone there are over a thousand such mines.

Table 2.4 shows total ore production through January 1, 1979 for active and inactive surface and underground mines. The larger mines (>910 MT ore production) dominate the list of active mines, and the smaller mines (<910 MT ore production) dominate the inactive list. If remedial action becomes necessary for inactive mines, the information in Table 2.4 could help estimate the magnitude of such an action, at least affording a way to make rough estimates of waste rock, sub-ore, and overburden that are present at the inactive site. A recent DOE report (DOE79c) contains additional information on mining waste tonnage and acreage of specific properties.

Table 2.1 Type of U.S. uranium properties

Uranium Production Method[a]	Number of Active Properties	Number of Inactive Properties
Surface mine	60	1252
Underground mine	256	2036
Mine water production	2	1
Heap leach - dumps	1	7
Heap leach - ores	0	1
Dumps	1	42
Sub-ore	1	12
In-situ leaching	11	2
Miscellaneous	0	23
Tailings dump	2	0
Unknown	6	13
TOTAL	340	3389

[a]Categories listed in this column are modifications of the originals (DOE79a). Copper by-product and surface-underground combination categories were eliminated because they contained no properties. The miscellaneous-phosphate by-product category was reduced to miscellaneous because most phosphate by-product properties were not included in the DOE-GJO master data file (DOE79a). The low grade or protore category was changed to sub-ore to be consistent with the rest of this report.

Table 2.2 The location and type of active uranium properties

State	Surface Mine	Underground Mine	Mine Water Production	Heap-Leach Dumps	Heap-Leach Ores	Dumps	Sub-ore	In-Situ Leaching	Miscellaneous	Tailings Dump	Unknown	Total
Arizona	1	1	0	0	0	0	0	0	0	0	0	2
Colorado	5	106	0	0	0	0	0	0	0	1	3	115
New Mexico	4	35	2	0	0	1	0	0	0	0	0	42
Texas	16	0	0	0	0	0	0	8	0	1	0	25
Utah	13	108	0	0	0	0	0	0	0	0	3	124
Washington	2	0	0	0	0	0	0	0	0	0	0	2
Wyoming	19	6	0	1	0	0	1	3	0	0	0	30
TOTAL	60	256	2	1	0	1	1	11	0	2	6	340

Table 2.3 The location and type of inactive uranium properties

State	Surface Mine	Underground Mine	Mine Water Production	Heap-Leach Dumps	Heap-Leach Ores	Dumps	Sub-ore	In-Situ Leaching	Miscellaneous	Tailings Dump	Unknown	Total
Alaska	0	1	0	0	0	0	0	0	0	0	0	1
Arizona	135	189	0	1	0	0	0	0	0	0	1	326
California	13	10	0	0	0	0	0	0	0	0	0	23
Colorado	263	902	0	0	0	35	1	0	10	0	6	1217
Florida	0	0	0	0	0	0	0	0	1	0	0	1
Idaho	2	4	0	0	0	0	0	0	0	0	0	6
Minnesota	0	0	0	0	0	0	0	0	1	0	0	1
Montana	9	9	0	0	0	0	0	0	0	0	0	18
Nevada	9	12	0	0	0	0	0	0	0	0	0	21
New Jersey	0	1	0	0	0	0	0	0	0	0	0	1
New Mexico	34	142	1	0	0	0	8	0	1	0	2	188
N. Dakota	13	0	0	0	0	0	0	0	0	0	0	13
Oklahoma	3	0	0	0	0	0	0	0	0	0	0	3
Oregon	2	1	0	0	0	0	0	0	0	0	0	3
S. Dakota	111	30	0	0	0	0	0	0	0	0	0	141
Texas	38	0	0	0	1	0	0	2	0	0	1	42
Utah	378	698	0	0	0	7	1	0	6	0	3	1093
Washington	13	0	0	0	0	0	0	0	0	0	0	13
Wyoming	223	32	0	6	0	0	2	0	2	0	0	265
Unknown	6	5	0	0	0	0	0	0	2	0	0	13
TOTAL	1252	2036	1	7	1	42	12	2	23	0	13	3389

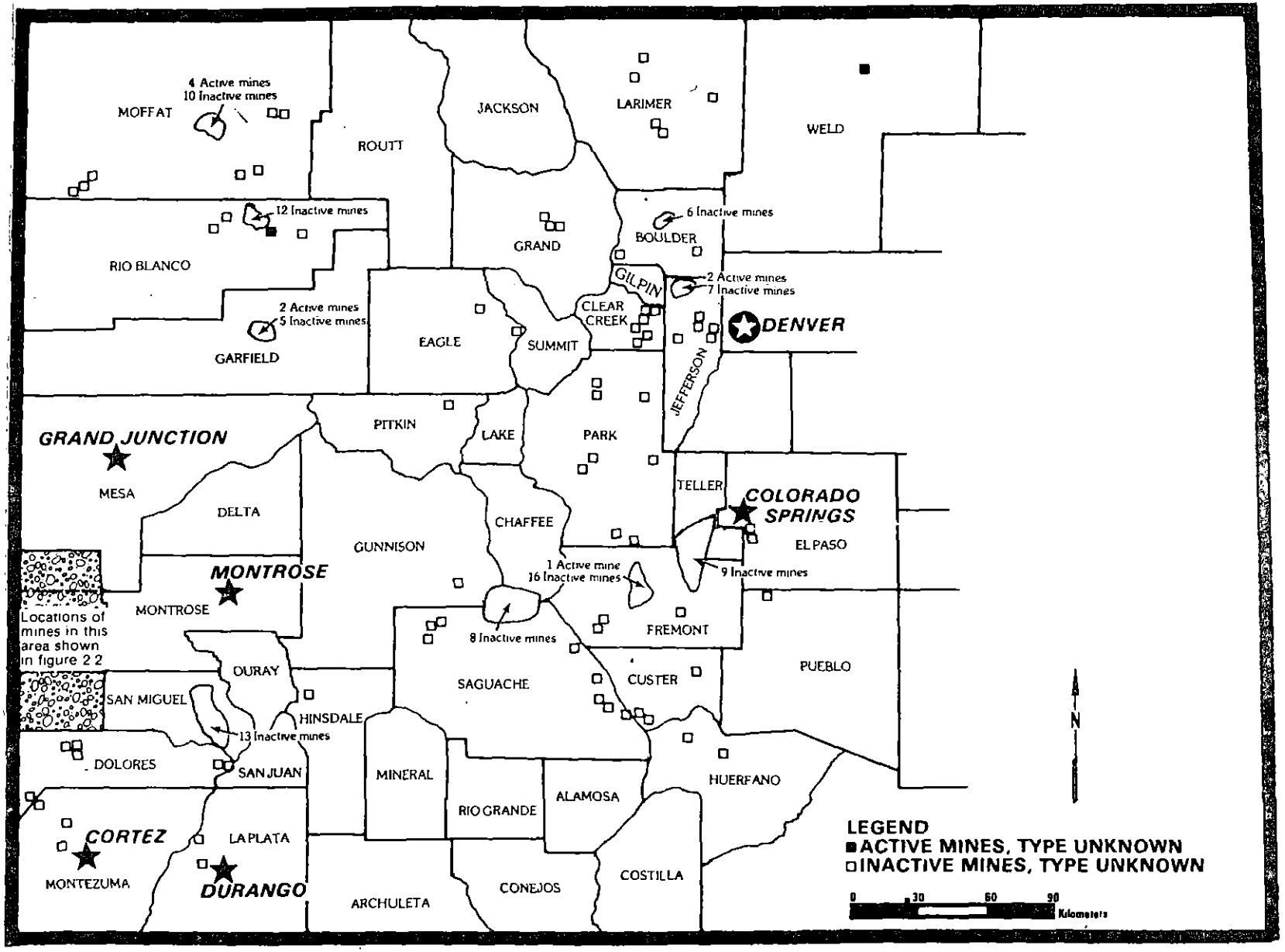

Figure 2.1 Location of active and inactive uranium mines and principal uranium mining districts in Colorado

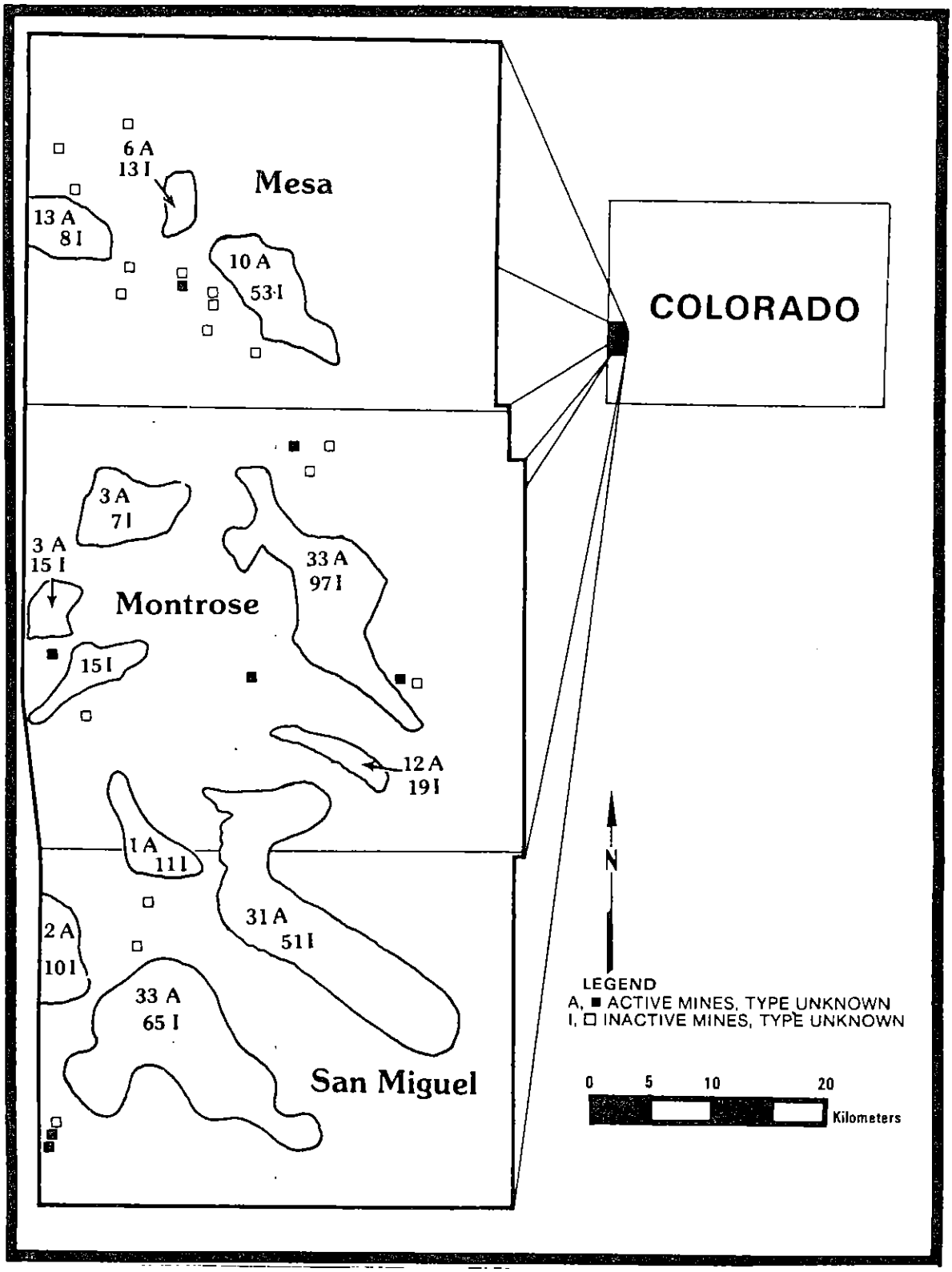

Figure 2.2 Location of active and inactive uranium mines and principal uranium mining districts in the Uravan Mineral Belt of western Colorado

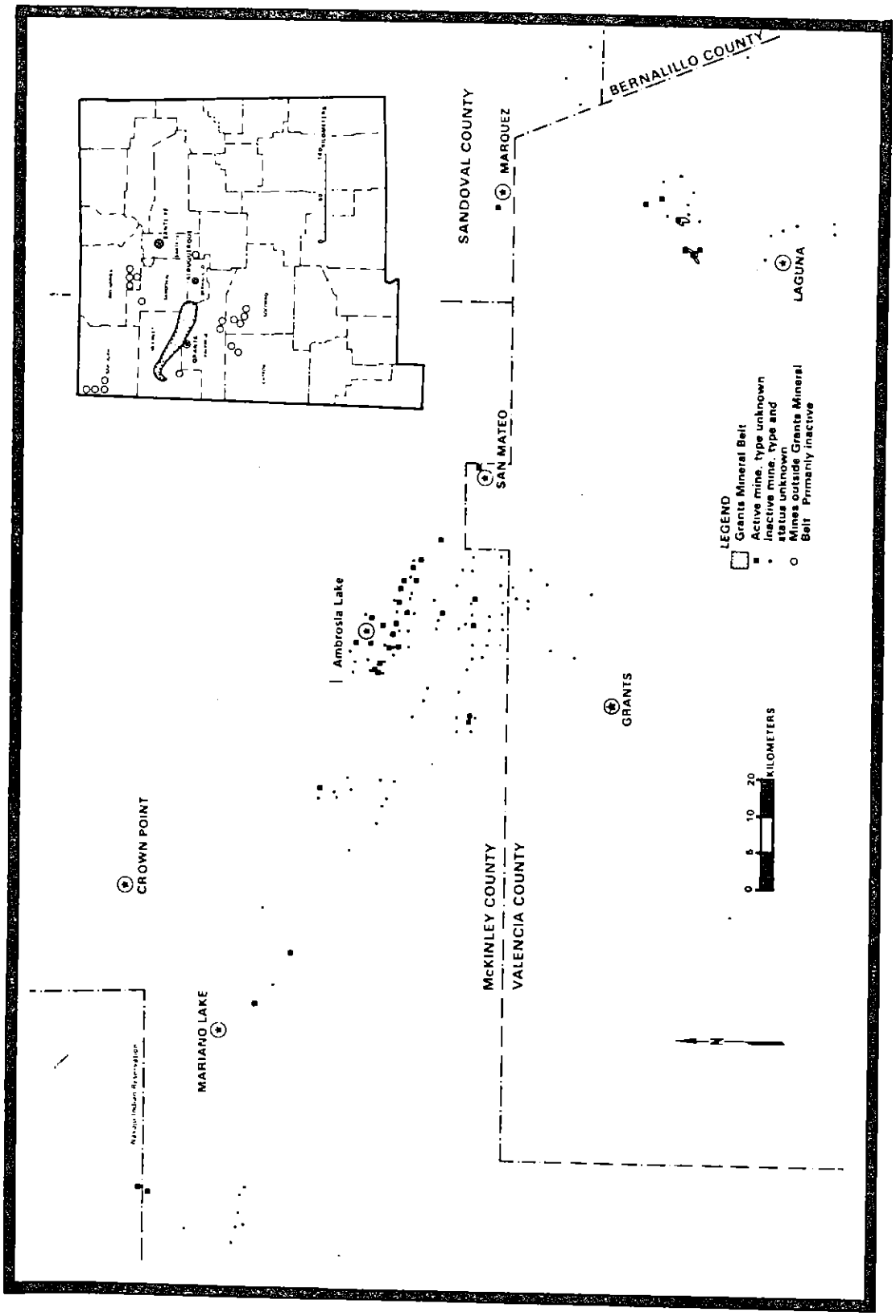

Figure 2.3 Location of active and inactive uranium mines in the Grants Mineral Belt and other areas of New Mexico

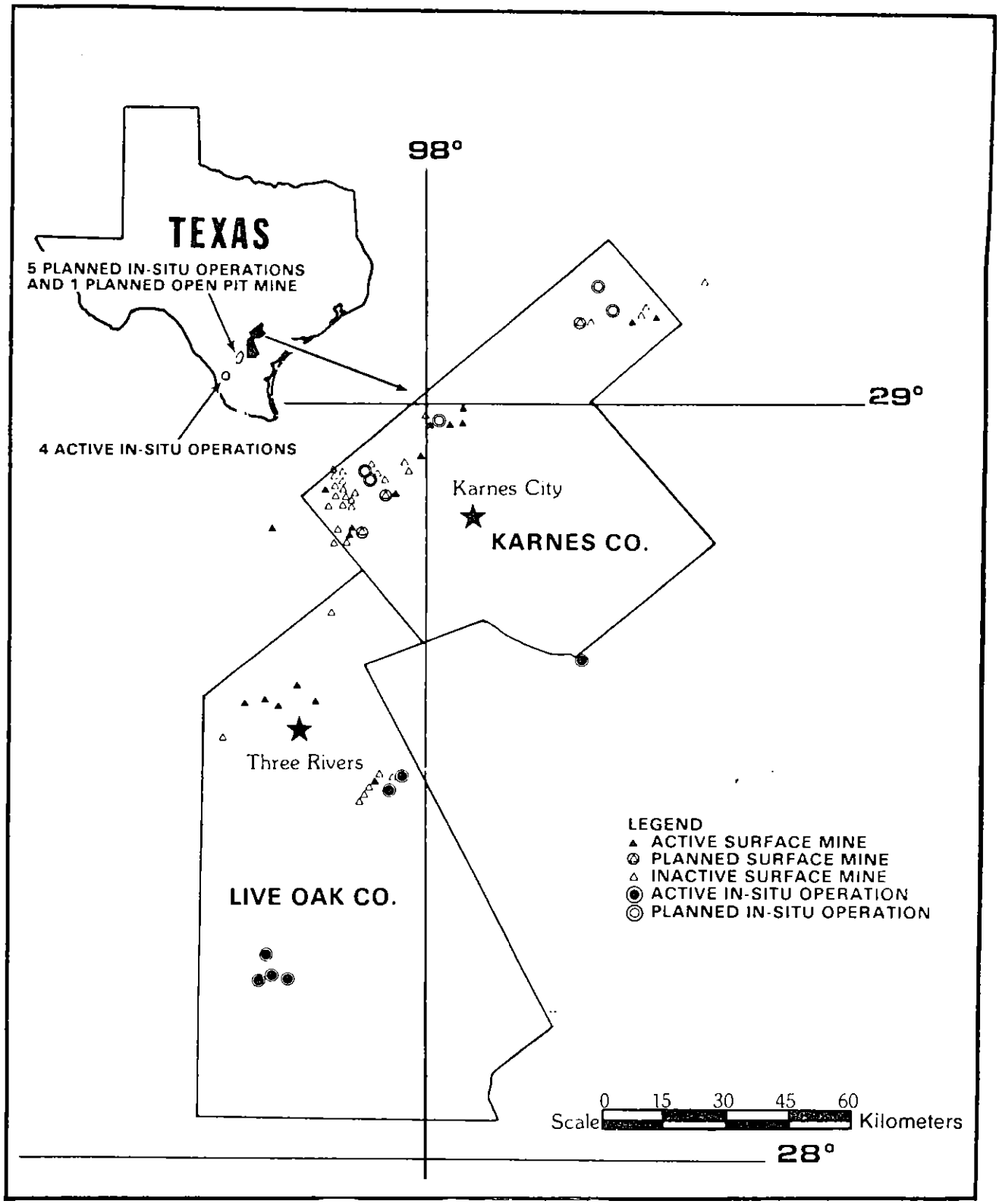

Figure 2.4 Location of active, inactive, and proposed surface and in situ uranium mines in Texas

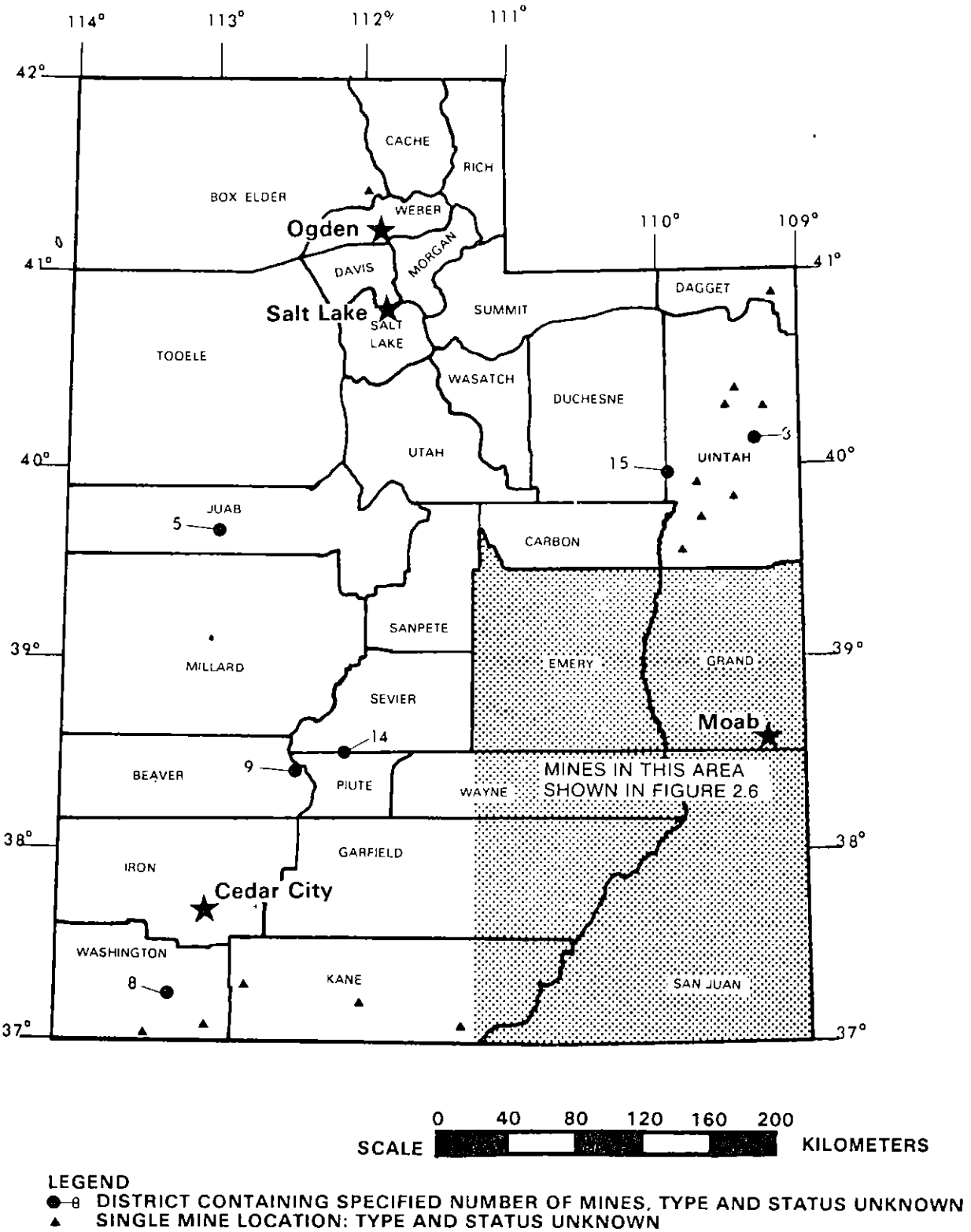

Figure 2.5 Location of uranium mines and mining districts in Utah

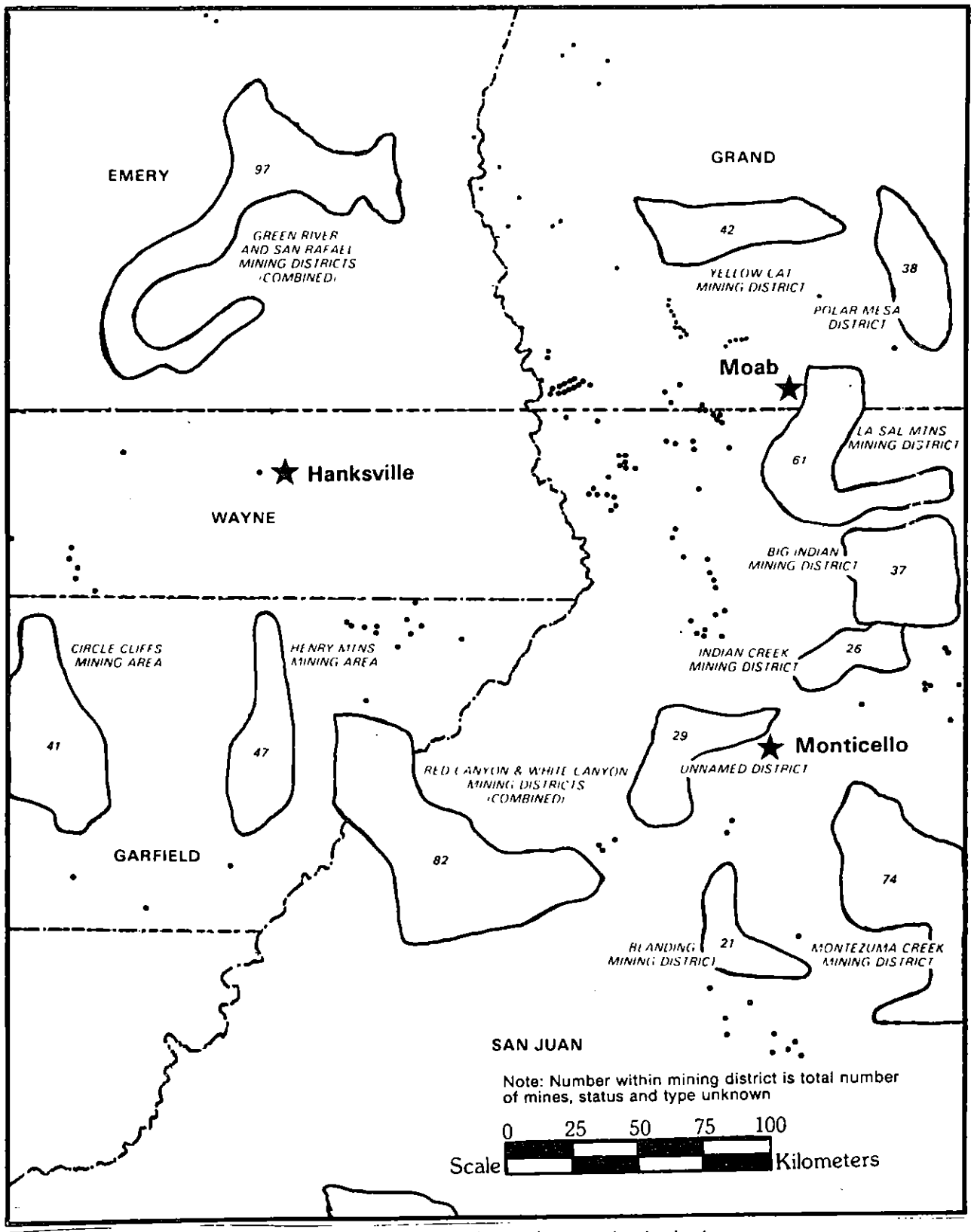

Figure 2.6 Location of uranium mines and principal uranium mining districts in southeastern Utah

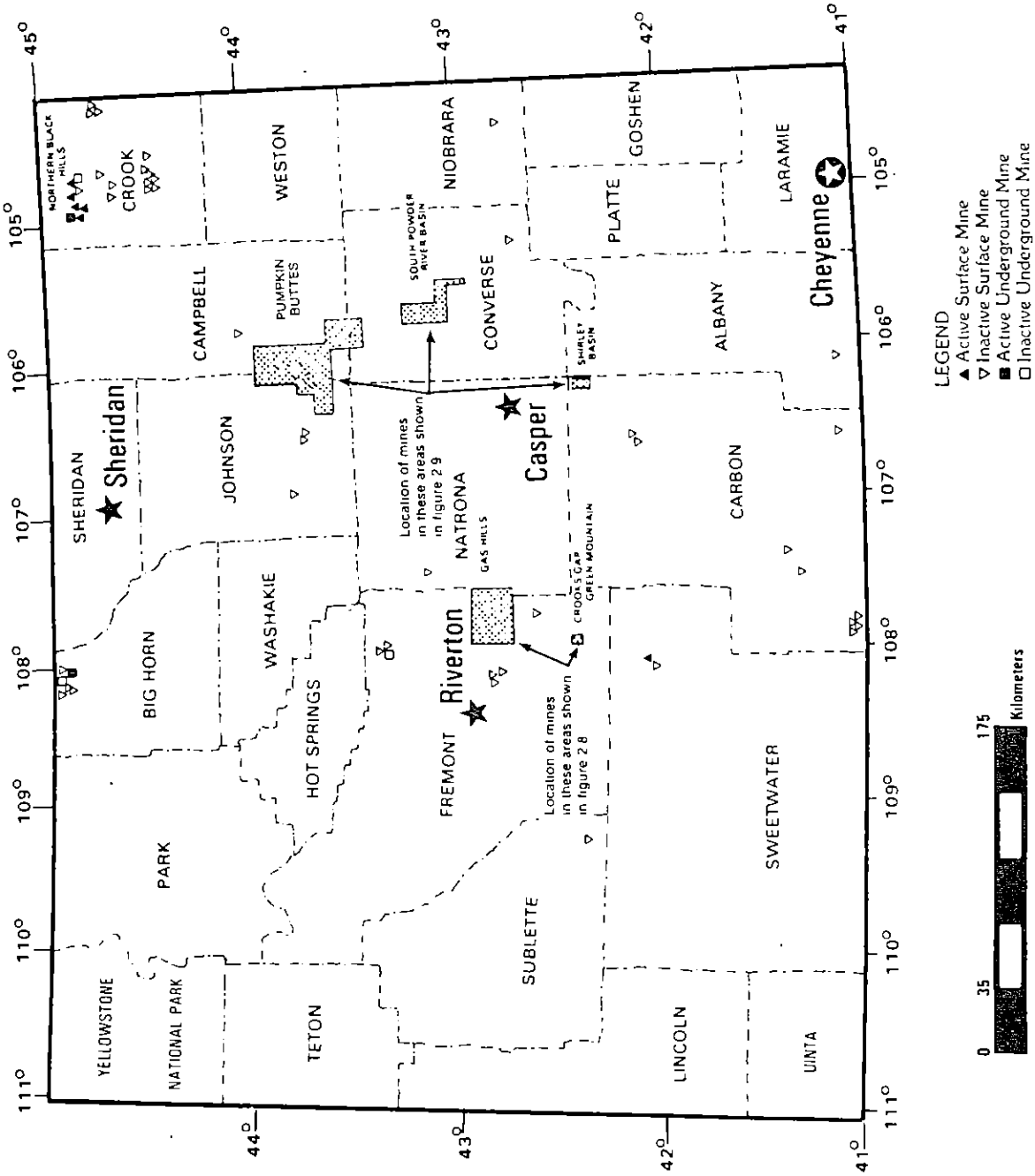

Figure 2.7 Location of active and inactive uranium mines and principal uranium mining areas in Wyoming

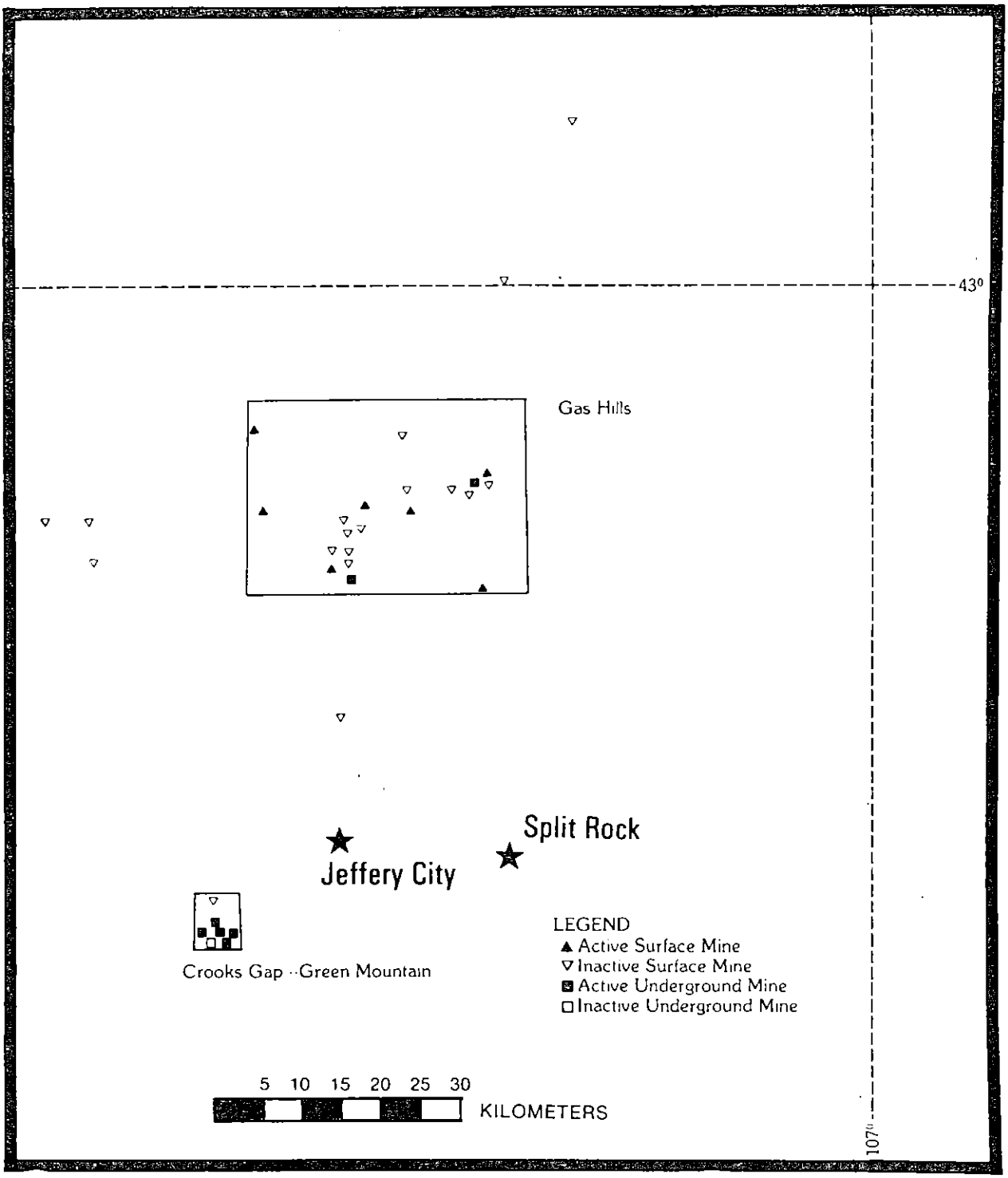

Figure 2.8 Location of active and inactive uranium mines in the Gas Hills and Crooks Gap-Green Mountain areas of central Wyoming

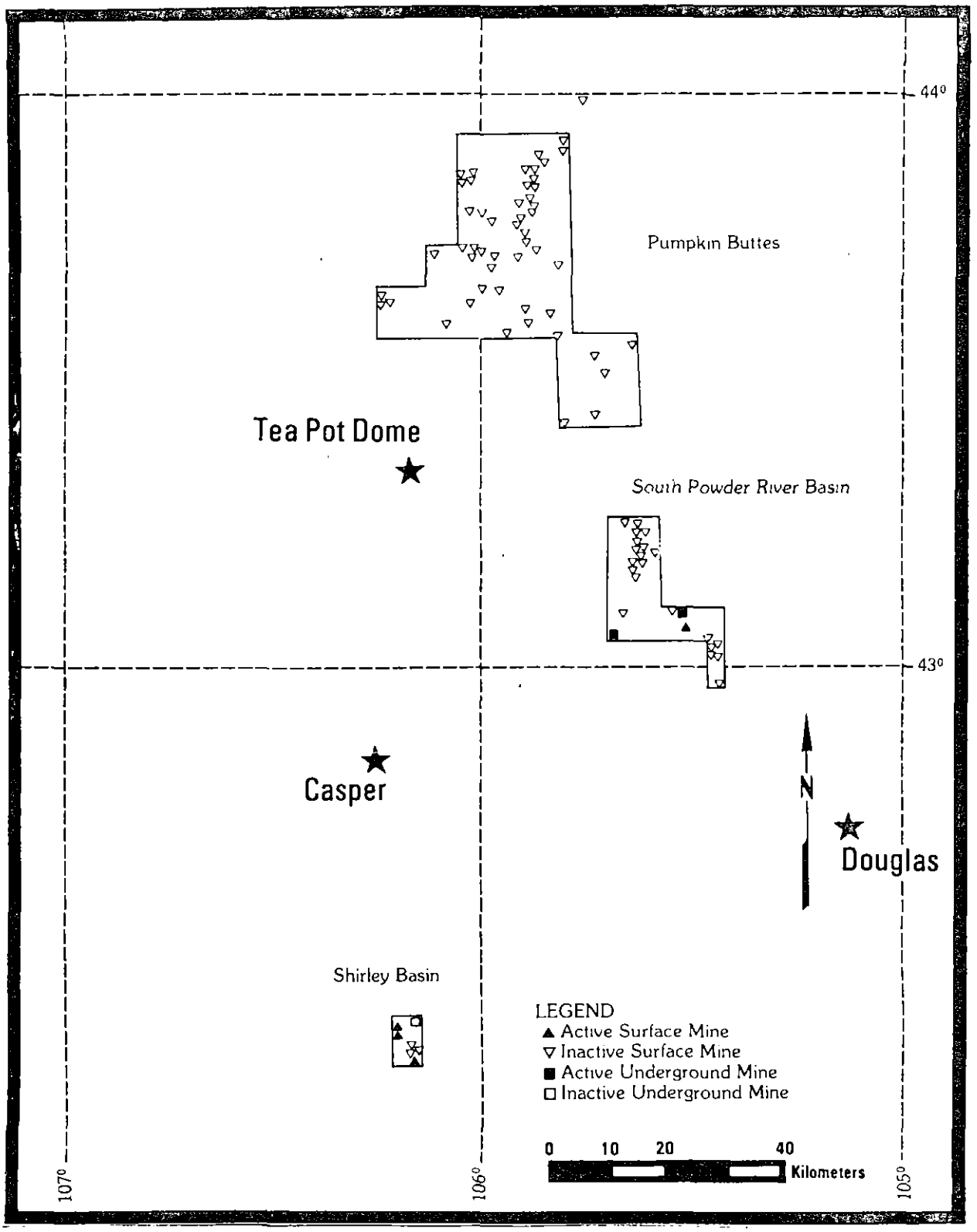

Figure 2.9 Location of active and inactive uranium mines in the Shirley Basin, South Powder River Basin, and Pumpkin Buttes areas of Wyoming

Table 2.4 Cumulative Ore Production
through January 1, 1979

Ore Production MT	Active				Inactive			
	No. Mines	(% of total)	Surface	Under-ground	No. Mines	(% of total)	Surface	Under-ground
< 91	16	(4.7)	8	3	1553	(45.8)	899	628
91-910	33	(9.7)	5	24	753	(22.2)	134	588
910-91,000	188	(55.3)	15	165	986	(29.1)	180	766
> 91,000	103	(30.3)	32	64	97	(2.9)	39	54
Total	340	(100.0)	60	256	3389	(100.0)	1252	2036

2.1 References

Ch77 Chapman, Wood, and Griswold, Inc., 1977, "Geologic Map of Grants Uranium Region," New Mexico Bureau of Mines and Mineral Resources Geological Map 31 (rev.).

Ch80 Personal communication with William L. Chenoweth (DOE-GJO), January 1980.

Co78a Colorado Geological Survey, Department of Natural Resources, State of Colorado, 1978, James L. Nelson-Moore, Donna Bishop Collins, and A. L. Hornbaker, "Radioactive Mineral Occurrences of Colorado and Bibliography", Bulletin 40.

Co78b Collier, J.D., Hornbaker, A.L., and Chenoweth, W.L., 1978, "Directory of Colorado Uranium and Vanadium Mining and Milling Activities", Colorado Geological Survey Map Series 11.

Co78c Cook, L.M., 1978, "The Uranium District of the Texas Gulf Coastal Plain", Texas Department of Health, Austin, Texas.

DOE79a Department of Energy, Grand Junction Office, 1979, magnetic computer tape of selected information on U.S. uranium mines.

DOE79b Department of Energy, 1979, "Statistical Data of the Uranium Industry", GJO-100(79), Grand Junction, Colorado.

DOE79c Department of Energy, 1979, "Report on Residual Radioactive Materials on Public or Acquired Lands of the United States", DOE/EV-0037, Washington, D.C.

Ea73 Eargle, D.H., Hunds, G.W., and Weeks, A.M.D., 1973, "Uranium Geology and Mines, South Texas", Bureau of Economic Geology Guidebook 12, University of Texas at Austin.

Gl75 Glass, G.B., Wendell, W.G., Root, F.K, and Breckenridge, R.M., 1975, "Energy Resources Map of Wyoming", Wyoming Geological Survey.

Hi69 Hilpert, L.S., 1969, "Uranium Resources of Northwestern New Mexico", USGS Professional Paper 603.

Me80a Letter from Robert J. Meehan (DOE-GJO) to Thomas R. Horton (EPA-EERF), dated January 16, 1980.

Me80b Personal communication with Robert J. Meehan (DOE-GJO), January 1980.

Pe79 Perkins, B.L., 1979, "An Overview of the New Mexico Uranium Industry", New Mexico Energy and Minerals Department, Santa Fe, New Mexico.

Ut77 State of Utah, Department of Natural Resources, Utah Geological and Mineral Survey, 1977, "Energy Resources Map of Utah", Map 44.